AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims

1. (currently amended)   A method, comprising:

(A) defining a first experimental space comprising factors of at least two mixtures with at least one common factor;

(B) determining a number of experiments for a ~~succeeding~~ second experimental space by the relationship

$$V + \prod_{i=1}^{3} n_i \times I_3 + \left[\sum_{i=1}^{3} \frac{1}{n_i} \prod_{i=1}^{3} n_i \right] \times I_2 \qquad ;$$

for a ternary system ($T = 3$) or an algorithm for a succeeding .T-nary system, determined from a previous term by:(a) adding an additional term which contains an additional summation, incremented over a next index from a starting point one unit higher than the first summation; (b) decrementing the subscript on I; and (c) adding a value of n, indexed by the next index, to the inverse term;

(C) deleting duplicate factor combinations from the first determined experimental space to define a ~~succeeding~~ second experimental space with a number of experiments determined in (B); and

(D) conducting a combinatorial high throughput screening (CHTS) experiment on said ~~succeeding~~ second experimental space, comprising an iteration of steps of simultaneously reacting a multiplicity of tagged reactants and identifying a multiplicity of tagged products of the reaction and evaluating said identified products after

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completion of a single or repeated iteration to select a best case set of factors from said second experimental space.

2. (canceled)

3. (canceled)

4. (canceled)

5. (canceled)

6. (canceled)

7. (currently amended)   The method of claim 1, wherein said ~~succeeding~~ second experimental space factors comprise reactants, catalysts and conditions and said (D) comprises (a) reacting a reactant selected from the ~~succeeding~~ second experimental space under a set of catalysts or reaction conditions selected from the ~~succeeding~~ second experimental space and (b) evaluating a set of products of the reacting step and further comprising (E) reiterating step (D) wherein a next ~~succeeding~~ second experimental space selected for a step (a) is chosen as a result of an evaluating step (b) of a preceding iteration of step (D).

8. (previously presented)   The method of claim 7, comprising reiterating (D) until a best set of factors of said second experimental space is selected.

9. (original)   The method of claim 1, wherein said first experimental space includes a catalyst system comprising combinations of Group IVB, Group VIB and Lanthanide Group metal complexes.

10. (currently amended)   The method of claim 1, wherein said ~~succeeding~~ second experimental space includes a catalyst system comprising a Group VIII B metal.

11. (currently amended)   The method of claim 1, wherein said ~~succeeding~~ second experimental space includes a catalyst system comprising palladium.

12. (currently amended)   The method of claim 1, wherein said ~~succeeding~~

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<u>second</u> space includes a catalyst system comprising a halide composition.

13. (currently amended)   The method of claim 1, wherein said ~~succeeding~~ <u>second</u> experimental space includes an inorganic co-catalyst.

14. (currently amended)   The method of claim 1, wherein said ~~succeeding~~ <u>second</u> experimental space includes a catalyst system that includes a combination of inorganic co-catalysts.

15. (canceled)

16. (canceled)

17. (canceled)

18. (currently amended)   A system for selecting a best case set of experiments of a experimental reaction, comprising:

a processor that (A) defines a first experimental space comprising factors of at least two mixtures with at least one common factor; (B) determines a number of experiments for a ~~succeeding~~ <u>second</u> experimental space by the relationship

$$V + \prod_{i=1}^{3} n_i \times I_3 + \left[\sum_{i=1}^{3} \frac{1}{n_i} \prod_{i=1}^{3} n_i \right] \times I_2$$

for a ternary system ($T = 3$) or an algorithm for a succeeding T-nary system, determined from a previous term by:(a) adding an additional term which contains an additional summation, incremented over a next index from a starting point one unit higher than the first summation; (b) decrementing the subscript on I; and (c) adding a value of n, indexed by the next index, to the inverse term; and (C) deletes duplicate factor combinations from the first determined experimental space to define a ~~succeeding~~ <u>second</u> experimental space with a number of experiments determined in (B); and

a reactor and evaluator to select a best case set of factors from said ~~succeeding~~ <u>second</u> experimental space by a combinatorial high throughput screening (CHTS) method

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to select a best case set of factors from said experimental space.

19. (original)   The system of claim 18, wherein said processor comprises

a display terminal having screen displays whereby a researcher can input values for factors on said screen;

a database for storing said factors;

a computer for generating a set of test cases for a set of said factors based on a researcher specified value for identifying a number of interacting relationships within said factors;

a computer combining said test cases for set of factors with said relationships and providing a merged table of test cases; and

an output for writing to a database said merged table of test cases.

20. (canceled)

21. (currently amended)   The system of claim 18, wherein said ~~succeeding~~ second experimental space is a quaternary space comprising a number of experiments defined by

$$V + \prod_{i=1}^{4} n_i \times I_4 + \left[\sum_{i=1}^{4} \frac{1}{n_i} \prod_{i=1}^{4} n_i \right] \times I_3 + \left[\sum_{i=1}^{4} \sum_{j=i+1}^{4} \frac{1}{n_i n_j} \prod_{i=1}^{4} n_i \right] \times I_2$$

22. (currently amended)   The system of claim 18, wherein said ~~succeeding~~ second experimental space is a pentanary space comprising a number of experiments defined by

$$V + \prod_{i=1}^{5} n_i \times I_5 + \left[\sum_{i=1}^{5} \frac{1}{n_i} \prod_{i=1}^{5} n_i \right] \times I_4 +$$

$$\left[\sum_{i=1}^{5} \sum_{j=i+1}^{5} \frac{1}{n_i n_j} \prod_{i=1}^{5} n_i \right] \times I_3 + \left[\sum_{i=1}^{5} \sum_{j=i+1}^{5} \sum_{k=j+1}^{5} \frac{1}{n_i n_j n_k} \prod_{i=1}^{5} n_i \right] \times I_2 \ .$$

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23. (original) An experimental space, comprising a number of mixture combinations defined by an algorithm, which expresses the sum of terms:

$$V + \prod_{i=1}^{T} n_i \times I_T + \left(\sum_{i=1}^{T}\frac{1}{n_i}\right) \times \left(\prod_{i=1}^{T} n_i\right) \times \left[I_{(T-1)}\right]$$

for a ternary system ($T = 3$) or an algorithm for a succeeding T-nary system, determined from a previous term by:(a) adding an additional term which contains an additional summation, incremented over a next index from a starting point one unit higher than the first summation ; (b) decrementing the subscript on I ; and (c) adding a value of n, indexed by the next index, to the inverse term.

24. (original) The experimental space of claim 23, comprising a number of mixture combinations defined by an algorithm, which expresses the sum of terms:

$$V + \prod_{i=1}^{4} n_i \times I_4 + \left[\sum_{i=1}^{4}\frac{1}{n_i}\prod_{i=1}^{4} n_i\right] \times I_3 + \left[\sum_{i=1}^{4}\sum_{j=i+1}^{4}\frac{1}{n_i\,n_j}\prod_{i=1}^{4} n_i\right] \times I_2$$

for a quaternary system.

25. (original) The experimental space of claim 23, comprising a number of mixture combinations defined by an algorithm, which expresses the sum of terms:

$$V + \prod_{i=1}^{5} n_i \times I_5 + \left[\sum_{i=1}^{5}\frac{1}{n_i}\prod_{i=1}^{5} n_i\right] \times I_4 +$$

$$\left[\sum_{i=1}^{5}\sum_{j=i+1}^{5}\frac{1}{n_i\,n_j}\prod_{i=1}^{5} n_i\right] \times I_3 + \left[\sum_{i=1}^{5}\sum_{j=i+1}^{5}\sum_{k=j+1}^{5}\frac{1}{n_i\,n_j\,n_k}\prod_{i=1}^{5} n_i\right] \times I_2$$

for a pentanary system.

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